

REMARKS

Applicants have amended the claims presently being considered on the merits, in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have amended claim 5 to recite that “the” chemical substance changes into another chemical substance having a chemical structure that is different from that of the chemical substance and that the another chemical substance luminesces, so that the chemical substance is adapted for use in luminescence. Note, for example, paragraph [0031] on page 10, as well as paragraphs [0037]-[0043] on pages 11-14, of Applicants’ specification. Claims 6-12 have been amended to recite “the” chemical substance and the another chemical substance, rather than first and second chemical substances, consistent with recitation of the chemical substance for luminescence.

In addition, Applicants are adding new claim 20 to the application. Claim 20, dependent on claim 5, recites that the chemical substance changes into the another chemical substance upon injecting an electric charge into the chemical substance, and that upon injecting another electric charge that is opposite to the first-recited electric charge, into the another chemical substance, an excited state of the another chemical substance is formed such that the another chemical substance luminesces. Note, for example, Figs. 1 and 2 of Applicants’ original disclosure, together with, for example, the paragraph bridging pages 13 and 14 of Applicants’ original specification.

The restriction requirement set forth on pages 2 and 3 of the Office Action mailed March 26, 2008, is noted. Consistent with the requirement therein, Applicants respectfully affirm their election of the Group III claims, that is, claims 5-16 and 19.

The contention by the Examiner that the specification is required to have a section concerning a brief description of the drawings, set forth on page 3 of the Office Action mailed March 26, 2008, is noted. The Examiner's attention is respectfully directed to the section entitled "Brief Description of Drawings", in paragraph [0120] on pages 42 and 43 of Applicants' specification. Clearly, Applicants' specification has such a section concerning a brief description of the drawings, as required by the Examiner.

It is acknowledged that in the present specification, the section entitled "Brief Description of Drawings" is at the end of the specification, different from the preferred order of arrangement set forth in Manual of Patent Examining Procedure (MPEP) 601, under subheading I. However, it is respectfully submitted that the order of arrangement set forth in MPEP 601 is only a preferred order, not required; and it is respectfully submitted that Applicants' original disclosure is proper, having a section concerning a brief description of the drawings.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action mailed March 26, 2008, that is, the teachings of the abstract of Meijs, et al., "A Convenient Route to Alkylidenecyclopropanes from Cyclopropyldiphenylphosphine Oxide and Carbonyl Compounds", in Tetrahedron Letters (1987), 28(45), 5559-60; Offenlegungsschrift DE 100 61 202; the abstract of Bally, "The Bicyclobutane Radical Cation Revisited: Electronic Structure and Mechanism of Ring Inversion", in Theochem (1991), 73, 249-64; and the abstract of Wurster, et al., "Luminosities of Hydrocarbons in the Gas Phase", in Am. Chem. Soc., Div. Petrol. Chem. Preprints (1960), 5(No. 4), C49-C58, under the provisions of 35 USC 102 and 35 USC 103.

It is respectfully submitted that the teachings of the references as applied by the Examiner would have neither taught nor would have suggested such a chemical substance as recited in the present claims, which changes into another chemical substance having a chemical structure that is different from that of the recited chemical substance and that the another chemical substance luminesces, so that the chemical substance is adapted for use in luminescence. See claim 5.

In addition, it is respectfully submitted that the applied references would have neither disclosed nor would have suggested such a chemical substance for luminescence as in the present claims, having features as discussed previously in connection with claim 5, and, additionally, wherein the another chemical substance turns back into the recited chemical substance after luminescence (see claim 6); and/or wherein the another chemical substance is formed via a bond formation reaction, or a bond cleavage reaction, from the recited chemical substance (see claims 7 and 8, respectively); and/or wherein the another chemical substance turns back into the recited chemical substance via a bond cleavage reaction, or via a bond formation reaction (see claims 9 and 10, respectively); and/or wherein the another chemical substance is an open-shell species having monoradical or biradical (see claim 11); and/or wherein the ground-state multiplicity of the another chemical substance is a triplet (see claim 12); and/or wherein the chemical substance is represented by the formulae (1), (4), (7) and (10) as in claims 13-16, respectively. and changes into another chemical substance having a chemical structure that is different from that of the recited formulae and that the another chemical substance luminesces, so that the recited chemical substance is adapted for use in luminescence, as in claims 13-16, respectively; and/or wherein the chemical substance changes into the another chemical substance upon injecting an electric

charge into the chemical substance, and that upon injecting another electric charge, that is opposite to the previously injected electric charge, into the another chemical substance, an excited state of the another chemical substance is formed such that the another chemical substance luminesces (see claim 20).

Furthermore, it is respectfully submitted that the references as applied by the Examiner would have neither taught nor would have suggested such a mixture for luminescence as in the present claims, including the chemical substance recited in claim 5 and a low and/or high molecular weight compound. See claim 19.

The present invention as being claimed herein is directed to a chemical substance for luminescence. Such chemical substance can be used in a luminescence system, for example, in a luminescent device such as an organic electroluminescent (EL) device.

EL devices have been attracting attention as large-scale solid state light sources to replace incandescent lamps and gas-filled lamps, and, furthermore, they have also been attracting attention as self-luminous displays, and are the most promising alternative to liquid crystal displays in the flat panel display field. A problem with previously proposed EL devices is that they have a low luminescence efficiency, which gives rise to problems when constructing a full-color display.

As described in the paragraph bridging pages 1 and 2 of Applicants' specification, as one means for solving this problem, a device utilizing phosphorescence from an excited triplet has been investigated. However, as described in paragraph [0007] on page 2 of Applicants' specification, most of the chemical substances that can utilize phosphorescence are metal complexes, and, also, problems with costs have not been solved. Moreover, many metal complexes

contain a heavy metal, and there is a desire for chemical substance that can utilize phosphorescence even if it does not employ a metal complex.

Against this background, and as a result of an intensive investigation by the present inventors, provided is a chemical substance, usable in a luminescence system, in which the chemical substance changes into another chemical substance having a chemical structure that is different from that of the first chemical substance and luminesces. That is, the chemical substance (an original chemical substance) changes into a second chemical substance having a chemical structure that is different from that of the original chemical substance, and the second chemical substance luminesces, whereby the original chemical substance is adapted for use in luminescence. Note paragraph [0031] on page 10 of Applicants' specification.

The original chemical substance and the chemical substance that actually produces luminescence have different chemical structures, and the chemical substance that actually produces luminescence exhibits a luminescence wavelength that is greatly different from the absorption wavelength of the original chemical substance.

Accordingly, efficient and effective luminescence can be achieved. Note paragraph [0062] on page 22 of Applicants' specification. The chemical substances according to the present invention, which are the original chemical substances changed into the another chemical substance which luminesces, are inexpensive and safe compounds containing no metal, their internal quantum efficiency is high due to the ground state being a triplet state, and they can be used in various types of luminescent devices including an organic electroluminescent device. See paragraph [0081] bridging pages 28 and 29 of Applicants' specification.

Meijs, et al. discloses alkylidenecyclopropanes prepared by intramolecular Wittig-Horner reaction of (diphenylphosphinyl) (hydroxyalkyl) cyclopropanes formed

by treatment of cyclopropyldiphenylphosphine oxide with BuLi and RCOR1. This article discloses 1-methylethylidene.

Bally reports on an examination by semiempirical and ab initio theory of the electronic structure and mechanism of the ring-inversion process in the radical cation of bicyclobutane. This article discloses bicyclo[1.1.0]butane.

Wurster, et al. reports on the use of an Erdco Luminometer to determine the gas phase luminosity (ΔT in °F) of cyclopropane, this article disclosing cyclopropane.

DE 100 61 202 discloses preparation of 1,6-hexanediol by reacting 1,5-hexadiene with an epoxidation agent to form 1,2,5,6-diepoxyhexane, then hydrogenation thereof in the presence of a catalyst, i.e., Raney cobalt.

It is respectfully submitted that none of the four references as applied by the Examiner would have disclosed or would have suggested such a chemical substance for luminescence as in the present claims, which changes into another chemical substance having a chemical structure that is different from that of the recited chemical substance and that the another chemical substance luminesces, much less that the chemical substance can be thereby adapted for use in luminescence, as in claim 5, or other features of the present invention as in claims 6-12, 19 and 20; or the compounds acting as the chemical substance (i.e., that changes into another chemical substance having a chemical structure that is different from that of the recited chemical substance and that the another chemical substance luminesces), and advantages thereof.

The contentions by the Examiner on pages 4 and 5 of the Office Action mailed March 26, 2008, that the rejected claims only cover the recited compound, is noted. It is respectfully submitted, however, that the recited compound has certain features as recited in all of the present claims being considered on the merits in the above-


identified application, that is, that the chemical substance changes into another chemical substance having a chemical structure that is different from that of the chemical substance and that the another chemical substance luminesces, so that the recited chemical substance is adapted for use in luminescence. It is respectfully submitted that the Examiner has not shown that the specific compounds relied on by the Examiner from the applied references, would have had the characteristics as recited in, e.g., claim 5.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

To the extent necessary, Applicants hereby petition for an extension of time under 37 CFR 1.136. Kindly charge any shortage of fees due in connection with the filing of this paper, including any extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (case 1204.46308X00), and please credit any overpayments to such Deposit Account.

Respectfully submitted,

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